



**POLITECNICO**  
MILANO 1863



**B³ LAB**  
Biosignals  
Bioimaging  
Bioinformatics

# A home-monitoring system for sleep disorders

## *Project Specifications*

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# SYSTEM DESCRIPTION

- **Sleep disorders** (insomnia, sleep apnea, ...) and, more in general, **sleep deprivation** are frequent among both adolescents and adults.
- They can have **severe consequences** affecting overall health, behavior, mood, and performance at work. Numerous **psycho-physiological conditions** (e.g., depression, chronic stress, cardiovascular diseases) and comorbidities are known to be associated with sleep deprivation, sometimes **in both directions** (e.g., depression and anxiety can reduce sleep quality, yet poor sleep can increase the risk of experiencing those).
- **Sleep deprivation** can result from sleep disorders or simpler poor **sleep hygiene**, which makes monitoring patients' sleep routines important.
- The system will allow the **at-home** monitoring and **in-hospital** follow-up of several biological and self-reported parameters to track physiological and mental changes and improve patients' care.

# SYSTEM DESCRIPTION

- Proper monitoring of sleep disorders can greatly facilitate **patients' empowerment** and **treatment follow-up**, improve **life quality**, and reduce the **risk of complications due to chronic sleep deprivation**.
- These goals require the regular assessment of several **clinical indices** and the adoption of **wearable technologies** to track relevant physiological parameters and behavioral markers of **sleep deprivation and related comorbidities**.
- Some indices can be collected **both at home and in hospitals**, while others can only be collected **in hospitals**.
- The complexity of sleep disorders requires appropriate assessment of **comorbidities** (e.g., cardiovascular diseases) and **risk factors**.

# FINAL REPORT STRUCTURE

## Project Report

### AIM OF THE WORK

### SYSTEM DESIGN

*Context analysis (max. 3 pages)*

*Modeling and describing the system in UML (Textual descriptions, Use case diagrams, Activity diagrams, Class diagrams)*

### DATABASE DESIGN

*Modeling and describing the database (via E-R Diagram)*

*Technical description of the tables*

### SYSTEM IMPLEMENTATION

*Description of the queries (with some examples)*

*Description of the Graphical User Interface (GUI)*

### CONCLUSIONS

*Including current limitations of your system and future work*

### REFERENCES

**DEADLINES** will be communicated later on

# HOW TO START (1)

Team proposals: 5 or 6 students per team.

Each team should send an email to ALL the following addresses:

[pierluigi.reali@polimi.it](mailto:pierluigi.reali@polimi.it), [eleonora.maggioni@polimi.it](mailto:eleonora.maggioni@polimi.it),  
[simone.costantini@polimi.it](mailto:simone.costantini@polimi.it), [gianluca.defranceschi@polimi.it](mailto:gianluca.defranceschi@polimi.it)

... providing members' **name, surname, personal code, email**

**DEADLINE FOR TEAM PROPOSALS → 26<sup>th</sup> February**

# HOW TO START (2)

## Software to be installed **by 26<sup>th</sup> February:**

Python and VScode: see instructions on WeBeep.

StarUML: <https://staruml.io/download>

- ➔ *Windows users*: Download the installer from the following link. You can use this trial version forever by clicking "Evaluate" every time.  
[StarUML 4.1.6](https://staruml.io/download)
- ➔ *MacOS users*: Download the installer from the following link. You will use this trial version for free for 30 days. After this period, don't buy the software! We will provide further instructions later on.  
<https://staruml.io/download>

Webex (just in case of remote lessons):  
<https://www.webex.com/it/downloads.html>

# HOW TO START (3)

1. **Create or join a team.** If you encounter difficulties finding any/some teammates, please send us an email with the required information. We will find a team for you!
2. Once you are in a team, start by analyzing the **context**: read the material uploaded on WeBeep ("Project\_Literature.zip") and search for additional papers/websites, looking for insights that can help you design an effective system to monitor sleep disorders.
  - ➔ Start thinking about **main users**, **physiological/behavioral parameters** that are important to track, **wearable devices** worth considering ...

This and the next laboratories will be dedicated to **team formation** and **context analysis**: knowledge of sleep disorders, symptoms, consequences, and possible treatments is crucial to understanding the different needs of each user and developing a useful and practical application for them.

**Don't hesitate to ask questions!**



# CONTEXT ANALYSIS OUTPUT (recommendation)

In the report, you are advised to structure the results of the context analysis in a table reporting each source (article, website, book, etc.) information and a summary of the main findings you will be using to develop a more functional and realistic application.

Source info	Main findings
First Author, Second Author, ..., Title, Journal, No., Vol., Pages, Year, DOI	<ul style="list-style-type: none"><li>• Finding 1</li><li>• Finding 2</li><li>• ...</li></ul>
Webpage title, Authors, Website	<ul style="list-style-type: none"><li>• Finding 1</li><li>• Finding 2</li><li>• ...</li></ul>
...	...